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DOCUMENTATION OF "DRAFT"

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1.0 INTRODUCTION

This report describes a computer-aided procedure to do elementary 2D drafting. This procedure is useful in the preparation of simple one page figures and diagrams for reports.

The user enters commands and data using the digitizer. This information is stored on a file using the program DIGITIZE. The program DRAFT interprets this file and in turn creates a DATAPLOT macro file. The user then runs DATAPLOT and calls the created macro to produce the desired picture. Figure 1 outlines the procedure described above.

2.0 THE DIGITIZER

Data can be entered from the digitizer via the 16 button keypad cursor and also from the digitizer keyboard. A program DIGITIZE is available for storing this information in a file on the VAX. See reference 1 for details.

3.0 DRAFT COMMANDS

There are three classes of commands that can be entered via the digitizer.

1) Keypad commands.

2) Keyboard '*' commands.

3) Keybcard '\' commands.

These commands are described more fully below.

3.1 Keypad Command

The commands available are shown in Fig. 2. There are two classes of keypad commands. The upper commands shown on the keys in Fig. 2 are activated directly by pressing the key. The lower commands shown are activated by first pressing 'ESCAPE' and then pressing the key. Note that all commands preceeded by a '*' in the figure are followed by a keyboard entry.

3.2 Keyboard '*' Commands

The number of commands that can be entered from the keypad is limited. Additional commands must be entered from the keyboard. Such commands all have a '*' in the first column.

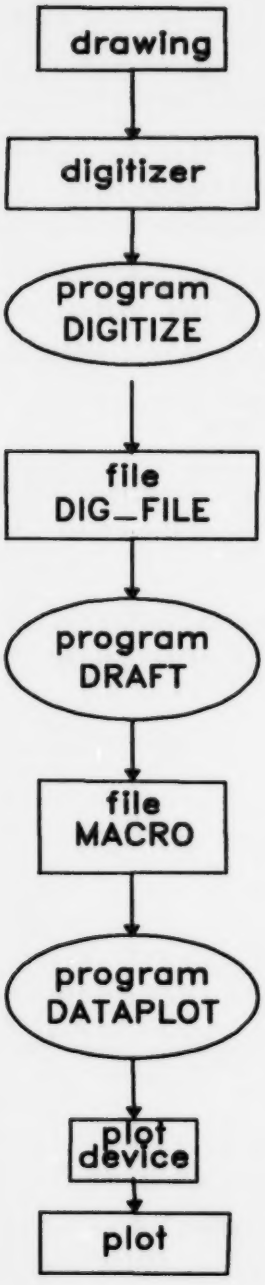


FIG. 1 The Drafting Procedure

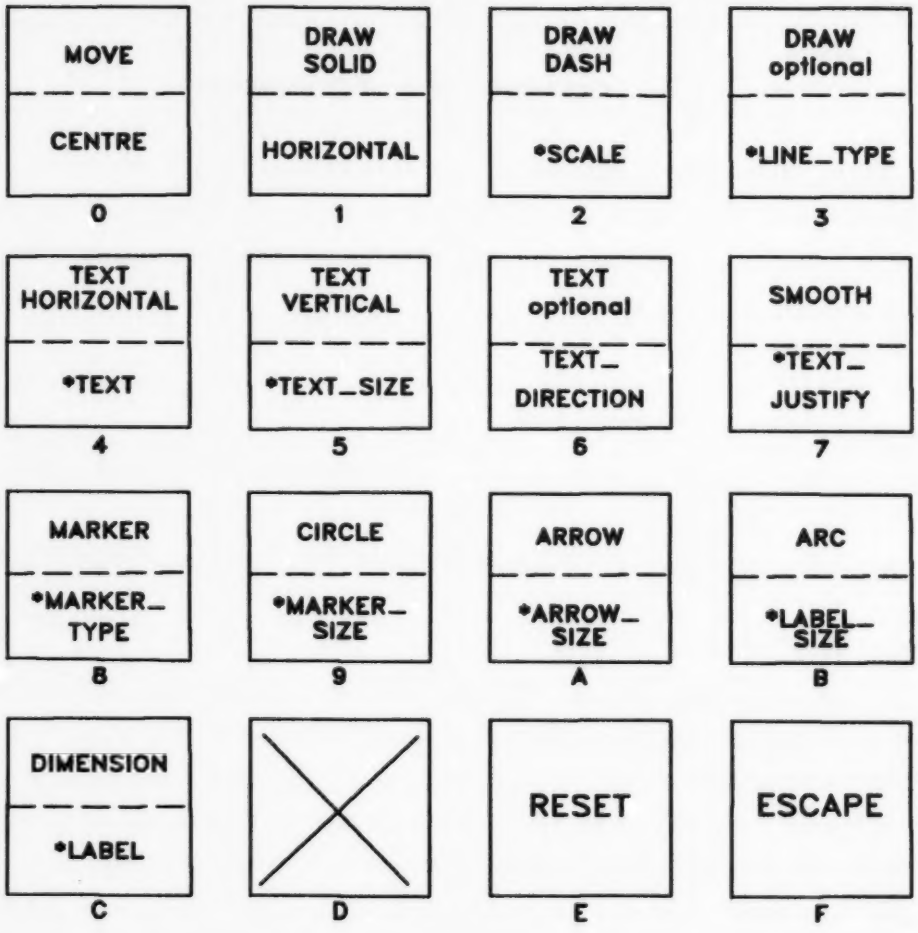


FIGURE 2 CURSOR KEYPAD

3.3 Keyboard '\' Commands

Any keyboard entry preceeded by a '\' is assumed to be a DATAPLOT command. DRAFT strips the '\' and placed the rest of the record in the DATAPLOT macro.

4.0 DESCRIPTION OF KEYPAD COMMANDS

4.1 Upper (non-ESCAPE) Commands

0) MOVE

This defines the current digitized point as the last point. DATAPLOT (DP) moves to this point.

1) DRAW SOLID

DP draws a solid line from the last point to the current point.

2) DRAW DASH

DP draws a dashed line from the last point to the current point.

3) DRAW optional

DP draws a line of line type *LINE-TYPE from the last point to the current point.

4) TEXT HORIZONTAL

DP places horizontal text *TEXT at the current point. The text size is *TEXT-SIZE and the text justification is *TEXT-JUSTIFY.

5) TEXT VERTICAL

DP places vertical text *TEXT at the current point. *TEXT-SIZE and *TEXT-JUSTIFY define the text size and the justification.

6) TEXT optional

DP places text *TEXT in direction TEXT-DIRECTION at the current point. *TEXT-SIZE and *TEXT-JUSTIFY define the text size and justification respectively.

7) SMOOTH

The current point is the first point of a sequence of points through which DRAFT fits a spline under tension *TENSION. The user enters the rest of the point sequence defining the spline using any key. The last entry is followed by a RESET key entry (the point digitized with the RESET key is not used). Currently a maximum of 50 points can be used to define the spline. Consecutive points must be distinct or the spline fit will fail. If the first point and last point coincide then DRAFT will fit a periodic spline. After fitting the spline DRAFT approximates the spline by *NUM-SMOOTH straight lines of equal length.

8) MARKER

DRAFT generates a centered symbol of type *MARKER-TYPE and size *MARKER-SIZE at the current point.

9) CIRCLE

The last point and the current point define the ends of a diameter. A circle is generated through these two points of line type *LINE-TYPE.

A) ARROW

An arrow is generated from the last point to the current point. The size of the arrow head is determined by *ARROW-SIZE.

B) ARC

This needs one endpoint, an intermediate point and the other endpoint in that order. A circular arc is generated through these 3 points. The last 2 points must be digitized using the ARC key. The line type used for the arc is determined by *LINE-TYPE.

C) DIMENSION

A DIMENSION is made of centered text defined by *LABEL and two arrows. The last point and the current point define the text direction. The values of *ARROW-SIZE and *LABEL-SIZE effect DIMENSION.

D) This key is not used in DRAFT.

E) RESET

This key is used to cancel an ESCAPE key entry. It is also used in SMOOTH to terminate point input.

F) ESCAPE

This will cause the next keypad key pressed to have lower function shown in Fig. 2.

4.2 Lower (ESCAPE) Commands

0) CENTRE

Defines the point on the user diagram that maps onto the centre of the 4014 screen. If used this should be the first command when using the digitizer.

1) HORIZONTAL

Defines the line on the user diagram that will appear horizontal on the 4014 screen. Both ends of the line are defined by this command, first the left point and then the right point. This should be one of the initial commands.

2) *SCALE

The following keyboard entry defines a new *SCALE. The default scale is 1. If the user wishes to increase size of the diagram when plotted, make *SCALE greater than 1., conversely to decrease the size select *SCALE less than 1.. This should be one of the initial commands.

3) *LINE-TYPE

The following keyboard entry redefines the line type. Any DATAPLOT line type is valid, e.g. SOLID, DASH, DOT, DASH1..., DASH6. The default *LINE-TYPE is DOT. *LINE-TYPE is used in DRAW optional, CIRCLE, ARC and SMOOTH.

4) *TEXT

The following keyboard entry defines *TEXT. This can be up to 75 characters. *TEXT is output when any of the TEXT commands are used.

5) *TEXT-SIZE

The following keyboard entry defines *TEXT-SIZE. This is defined by 2 real numbers in free format. These quantities define the height and width of the *TEST characters in DATAPLOT screen coordinates. The default values are 2. 1..

6) TEXT-DIRECTION

The last digitized point and the current point define the TEXT-DIRECTION. The default direction is horizontal. This quantity is needed when TEXT optional is used.

7) *TEXT-JUSTIFY

The following keyboard entry defines the text justification with respect to the current point when any of the TEXT keys are activated. Valid values are LEFT, RIGHT, and CENTRE. The default value is LEFT.

8) *MARKER-TYPE

The following keyboard entry defines the marker type. DRAFT defines 4 centered symbols (markers). These are CIRCLE, SQUARE, TRIANGLE and X. The default value is CIRCLE.

9) *MARKER-SIZE

The following keyboard entry defines the size of the marker. This is defined by 1 real value in DATAPLOT screen coordinates. The default size is .75.

A) *ARROW-SIZE

The following keyboard entry defines the arrow head size. This is defined by 2 real quantities that define the height and width in DATAPLOT screen coordinates. The default size is .4 .4.

B) *LABEL-SIZE

The following keyboard entry defines the label size used when the DIMENSION command is performed. The size is defined by 2 real quantities that define the height and width in DATAPLOT screen coordinates. The default size is 1. .75.

C) *LABEL

The following keyboard entry defines the label text used when the DIMENSION command is performed. The default is no label. A maximum of 30 characters is allowed.

D) Not used in DRAFT

E) RESET

Cancels the ESCAPE.

F) ESCAPE

Two or more consecutive ESCAPE's are treated as 1 ESCAPE.

5.0 KEYBOARD '*' COMMANDS

There are currently 3 commands that do not involve the keypad. All the command are entered on the keyboard with a '*' in column 1.

1) *TENSION

The user can define the tension used in the spline fitting associated with the SMOOTH command. The default tension is .1. e.g. *TENSION 2.5.

2) *NUM-SMOOTH

After the spline associated with the SMOOTH curve has been fitted to the data the spline has to be plotted. DRAFT subdivided the spline into *NUM-SMOOTH straight lines of equal length. e.g. *NUM-SMOOTH 300.

3) *CH

This command allows the user to enter digitized data in DATAPLOT screen coordinates into DATAPLOT. For example if the user enters '*CH X1 Y1' then point digitized using the keypad is converted to screen coordinates and set to X1 and Y1 respectively.

6.0 SUMMARY OF "DRAFT" PARAMETERS

The following table summarizes valid values and defaults for various parameters.

TABLE

Summary of DRAFT Parameters

Parameter	Type	Possible Values	Default	
*ARROW-SIZE	2 real numbers	positive nos.	.4	.4
*LABEL-SIZE	2 real numbers	positive nos.	1.	.75
*LINE-TYPE	text	SOLID, DASH, DOT, DASH1..., DASH6	DOT	
*MARKER-SIZE	1 real number	positive no.	.75	
*MARKER-TYPE	text	CIRCLE, SQUARE, TRIANGLE, X	CIRCLE	
*NUM-SMOOTH	1 integer	positive no.	200	
*SCALE	1 real number	positive no.	1.	
*TENSION	1 real number	nonneg. no.	.1	
*TEXT-SIZE	2 real numbers	positive no.	2.	1.

7.0 PLOT SIZE CONSIDERATIONS

There is no windowing feature in DRAFT. The whole digitized diagram must fit onto the screen of the Tektronix 4014.

The user selects the point on the diagram that maps onto the centre of the 4014 screen using the CENTRE keypad command. The size of the 4014 screen is 36.27 cm in the horizontal direction and 27.66 cm in the vertical direction (14.28 in by 10.89 in). If the diagram is too large it must be reduced in size for plotting using the *SCALE command.

4663 Plot Sizes

class	size
A2	52.45 cm by 40.00 cm (20.65 in by 15.75 in)
A3	36.32 cm by 27.70 cm (14.30 in by 10.90 in)
A4	24.91 cm by 19.00 cm (9.81 in by 7.48 in)

If the user wishes to achieve a 1 to 1 plot on A2 size paper the scale should be set to 36.27/52.45 = 0.6915. A 1 to 1 plot on A4 plot size would be achieved by setting scale = 1.456.

8.0 RUNNING DIGITIZE

DIGITIZE is the program that saves the data, that the user creates using the digitizer, on a disk file. See reference 1 for details. The logical name of the file created is DIGFILE. The user must ASSIGN a file name to this. When DIGITIZE is run the user should always select the standard output format.

9.0 EXAMPLES OF DIGITIZER INPUT

Examples 1 to 4 demonstrate the digitizer input necessary to activate many of the functional capabilities of DRAFT. Example 1 outlines how the examples should be interpreted.

10.0 RUNNING DRAFT

When the digitizer file has been created the user must run DRAFT to interpret the data on this file and create a macro file suitable for running as a DATAPLOT macro.

The user must assign the following two file prior to running DRAFT. DIG-FILE is the logical name of the digitizer input file and MACRO is the logical name of the macro output file.

```
ASSIGN file.DAT DIG-FILE
ASSIGN file.MAC MACRO
DRAFT
```

DRAFT does not output any messages unless there is digitizer input that it cannot interpret.

11.0 PLOT CORRECTIONS AND MODIFICATIONS

The user can edit the file created using the digitizer. The DATAPLOT macro file created by DRAFT can also be edited, if desired.

If the user uses the same CENTRE, the same HORIZONTAL and the same SCALE it is possible to merge two or more digitizer data files using the editor.

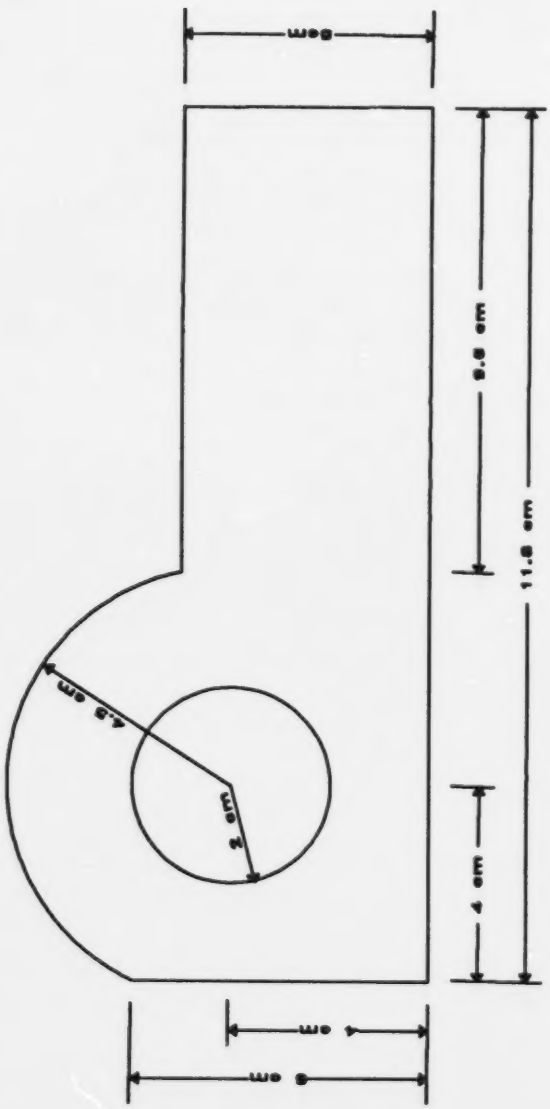
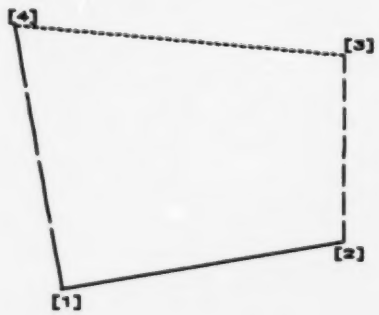


Figure 3 Example

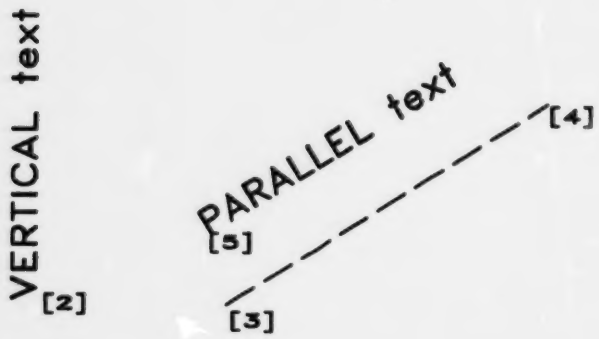



```
[1]0
[2]1
[3]2
[4]3
[ ]F
[ ]5
DASH2
[1]3
```

INTERPRETATION

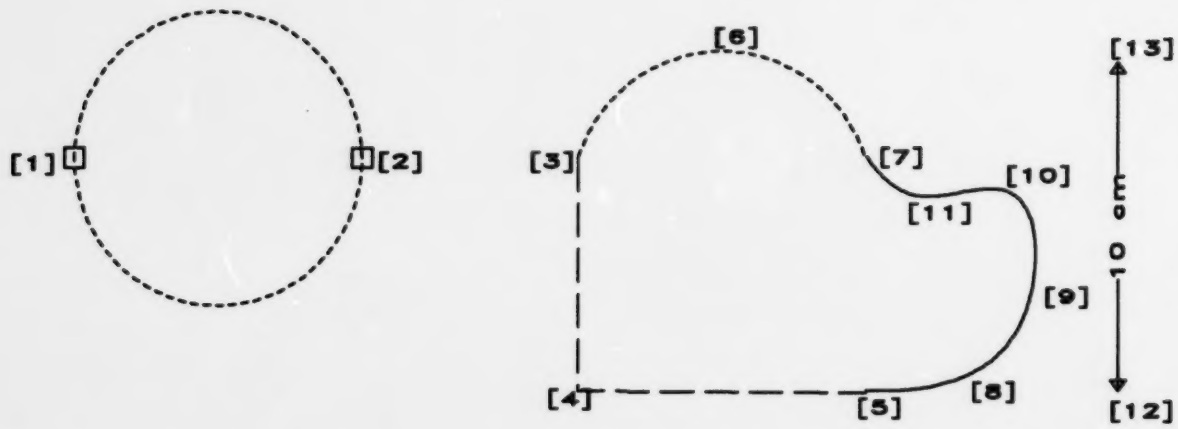
1) Numbers in figure with [ ] are not plotted.
2) [n]m means place digitizer cursor on point n and press keypad m.
3) [ ]m means press digitizer keypad key m. The cursor position is immaterial.
4) All data that does not begin with [is entered from the digitizer keyboard.

EXAMPLE 1. Using MOVE, DRAW and *LINE_TYPE



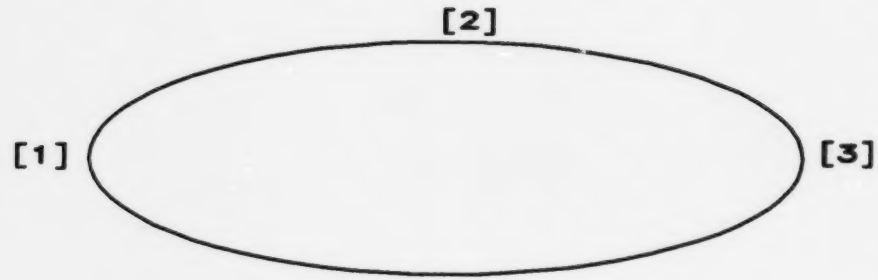

```
[ ]F
[ ]4
HORIZONTAL LC()TEXT
[1]4
[ ]F
[ ]4
VERTICAL LC()TEXT
[2]4
[3]0
[4]2
[5]0
[ ]F
[ ]6
[ ]F
[ ]4
PARALLEL LC()TEXT
[5]6
[ ]F
[ ]7
CENTRE
[ ]F
[ ]4
CENTERED LC()TEXT
[6]4
```


EXAMPLE 2. Using TEXT, *TEXT, *TEXT_DIR'N and *TEXT_JUSTIFY




```
[1]0          [5]7          [2]8
[2]9          [8]0          [ ]F
[8]0          [9]0          [ ]C
[4]2          [10]0         10 LC()CM
[5]2          [11]0         [12]0
[8]0          [7]0          [18]C
[6]8          [ ]E
[7]8          [ ]F
[ ]F          [ ]8
[ ]8          SQUARE
SOLID         [1]8
```

EXAMPLE 3
Using CIRCLE, ARC, SMOOTH, DIMENSION and MARKER




```
*CH X1 Y1
[ ]1
*CH X2 Y2
[ ]2
*CH X3 Y3
[ ]3
\ELLIPSE X1 Y1 X2 Y2 X3 Y3
```

EXAMPLE 4. Using *CH

12.0 REFERENCE

(1) Toews, Yu and Wong: Documentation of Computer Program DIGITIZE. MRP/MRL 83-81